

Amendments to the Claims:

This listing of claims will replace all prior versions, and listing of claims in the application:

Listing of Claims:

1. (Currently amended) A method for improving the efficiency of exchanging a first fluid within a gel by a second fluid comprising applying pulses of pressure having at least one frequency to the gel, the first fluid and the second fluid during the exchange, wherein the first fluid is a solvent liquid used to prepare the gel and the second fluid is a supercritical fluid.
2. (Cancelled)
3. (Cancelled)
4. (Original) The method of claim 1, wherein the pulses have a frequency of about 1 to 100,000 Hz and an amplitude of about 0.1 to 20 psi.
5. (Original) The method of claim 1, wherein the pulses have a frequency of about 2,000 to 50,000 Hz and an amplitude about 0.3 to 5 psi.
6. (Original) The method of claim 1, wherein the pulses have a frequency of about 0.0001 to about 10 Hz and an amplitude of about 10 to 1,000 psi.
7. (Original) The method of claim 1, wherein the pulses have a frequency in the range of about 0.001 to about 1 Hz and an amplitude about 100 to 600 psi;
8. (Cancelled)
9. (Original) The process of claim 1, wherein the gel is an inorganic gel.
10. (Currently Amended) The process of claim 9, wherein the inorganic gel is an ~~oxides~~ oxide of a metal selected from the group consisting of silicon, aluminum, iron, copper, zirconium, hafnium, magnesium, yttrium, and mixtures thereof.
11. (Original) The process of claim 1, wherein the gel is an organic gel.
12. (Original) The process of claim 11, wherein the organic gel is selected from the group consisting of polyacrylate, polystyrene, polyacrylonitrile, polyurethane, polyimide, polyfurfural alcohol, phenol furfuryl alcohol, polyfurfuryl alcohol, melamine-formaldehyde resin, resorcinol-formaldehyde resin, cresol formaldehyde resin, phenol-formaldehyde resin, polyvinyl alcohol dialdehyde, polycyanurate,

polyacrylamide, epoxy resin, agar, and mixtures thereof.

13. (Cancelled)

14. (Currently Amended) The method of claim + 48, wherein the first fluid is a supercritical fluid and the second fluid is a non-reacting, non-condensable gas.

15. (Original) The method of claim 14, wherein the inert non-reacting non-condensable gas is selected from the group consisting of air, nitrogen, oxygen, helium, neon, argon, hydrogen, and mixtures thereof.

16. (Currently Amended) The method of claim + 48, wherein the first fluid is a supercritical fluid and the second fluid is a gas.

17. (Currently Amended) The method of claim + 48, wherein the first fluid is a liquid and the second fluid is a liquid.

18. (Original) The method of claim 1, wherein the gel is an inorganic gel prepared by the hydrolysis and condensation of a metal alkoxide.

19. (Original) The method of claim 18, wherein the metal alkoxide has about 1 to 6 carbon atoms in each alkyl group.

20. (Currently amended) The method of claim 18, wherein the metal alkoxide is selected from the group consisting of tetra-ethoxysilane (~~TEOS~~), tetramethoxysilane (~~TMOS~~), tetra-n-propoxysilane, aluminum isopropoxide, aluminum sec-butoxide, cerium isopropoxide, hafnium tert-butoxide, magnesium aluminum isopropoxide, yttrium isopropoxide, zirconium isopropoxide, and mixtures thereof.

21. (Original) The method of claim 1 wherein the pulses are generated by one or more of a piezoelectric device, an electromechanical device, a mechanical device, liquid piston, a piston, a diaphragm, an inflatable device, audio frequency speakers, mechanical tapping, vibrating table, and a variation in the pressure or the back pressure of a fluid or a flowing gas.

22. (Cancelled)

23. (Cancelled)

24. (Currently Amended) ~~The method of claim 1 further comprising A method for reducing the time required to exchange a solvent liquid located within a gel with a supercritical extracting fluid in a means for performing the exchange during the preparation of an aerogel, comprising providing the said solvent liquid within the said gel at a tem-perature temperature of no more than 10 °C below the critical temperature of the super-critical fluid before the supercritical fluid contacts the solvent liquid, and further comprising applying pressure pulses of at least one~~

~~frequency to the gel, the solvent liquid and the supercritical extracting fluid during the exchange.~~

25. (Cancelled)

26. (Cancelled)

27. (Cancelled)

28. (Original) The method of claim 24, wherein the pulses are generated by one or more of a piezoelectric device, an electromechanical device, a mechanical device, liquid piston, a piston, a diaphragm, an inflatable device, audio frequency speakers, mechanical tapping, vibrating table, and a variation in the pressure or the back pressure of a fluid or a flowing gas.

29. (Currently Amended) A method for rapid depressurization of a supercritical fluid within and around a porous medium, the method comprising exchanging the supercritical fluid with a non-reacting, non-condensing gas before or during the depressurization wherein said exchange takes place at a pressure range selected from supercritical CO₂ pressures, just below the critical pressure of the supercritical fluid or a range starting from a supercritical pressure to just above the end pressure after depressurization.

30. (Original) The method of claim 29, wherein the porous medium is an aerogel.

31. (Original) The method of claim 29, further comprising applying pulses of pressure during said exchange.

32. (Cancelled)

33. (Cancelled)

34. (Cancelled)

35. (Cancelled)

36. (Original) The method of claim 31, wherein the pulses are generated by one or more of a piezoelectric device, an electromechanical device, a mechanical device, liquid piston, a piston, a diaphragm, an inflatable device, audio frequency speakers, mechanical tapping, vibrating table, and a variation in the pressure or the back pressure of a fluid or a flowing gas.

37. (Cancelled)

38. (Cancelled)

39. (Cancelled)
40. (Cancelled)
41. (Cancelled)
42. (Currently Amended) A method of exchanging the solvent liquid in a wet gel with a supercritical fluid to form an aerogel, the method comprising: providing an extractor containing the wet gel having a porous structure, said gel containing within its pores a solvent liquid; providing a supercritical fluid in the extractor in contact with and in approximate equilibrium of pressure and temperature with the solvent liquid-containing wet ~~gels~~ gel; and applying pulses of pressure to said supercritical fluid, thereby accelerating the mixing of the supercritical fluid and the solvent liquid.
43. (Cancelled)
44. (Cancelled)
45. (Cancelled)
46. (Cancelled)
47. (Cancelled)
48. (New) A method for improving the efficiency of exchanging a first fluid within a gel by a second fluid comprising applying pulses of pressure having at least one frequency to the gel, the first fluid and the second fluid during the exchange wherein said gel is in a bead, monolithic or composite form.
49. (New) The method of claim 48 wherein the frequency of pulses is between 0.0001 Hz and 100,000 Hz.
50. (New) The method of claim 48 wherein the amplitude of pulses between 0.001 and 1000 psi.
51. (New) The method of claim 48 wherein the gel comprises organic, inorganic materials or mixtures thereof.